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(71) Applicant (for all designated States except US): KONIN-
KLIJKE PHILIPS ELECTRONICS N.V. [NL/NL];
Groenewoudseweg 1, NL-5621 BA Eindhoven (NL).

(72) Inventors; and

(75) Inventors/Applicants (for US only): REEFMAN, Derk
[NL/NL]; c/o Prof. Holstlaan 6, NL-5656 AA Eindhoven
(NL). JANSSEN, Erwin [NL/NL]; c/o Prof. Holstlaan 6,
NL-5656 AA Eindhoven (NL).

(74) Agent: GROENENDAAL, Antonius, W., M.; Philips
Intellectual Property & Standards, Prof. Holstlaan 6,
NL-5656 AA Eindhoven (NL).

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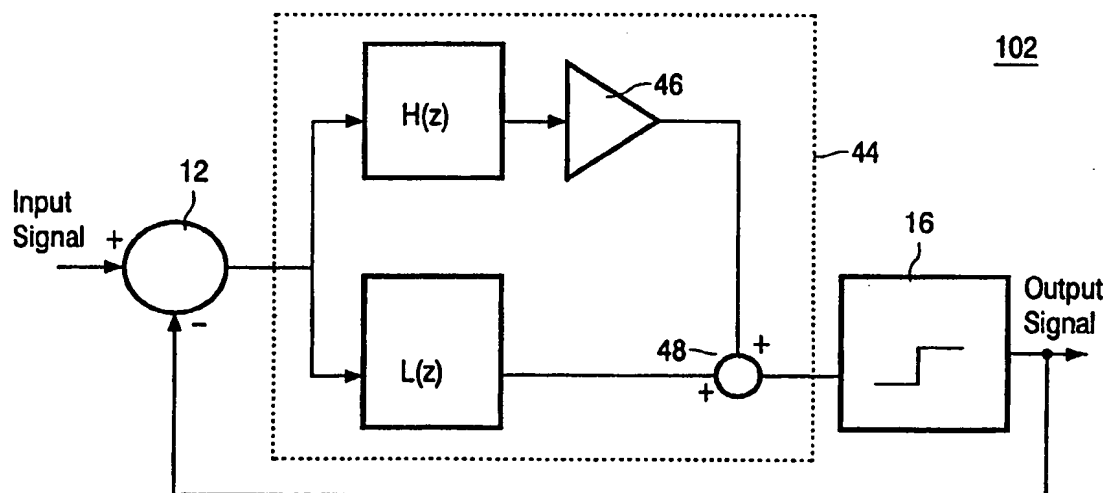
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[Continued on next page]

(54) Title: SIGMA-DELTA MODULATION



(57) Abstract: Sigma-delta modulation is provided, wherein an input signal is fed to at least two parallel filters, a first one of the filters preferably being a lower order filter and a second one of the filters preferably being a higher order filter, wherein output of the filters are weighted and wherein the weighted output from the at least two filters is quantized, in order to enable a sigma-delta modulation with variable order.



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Minimum documentation searched (classification system followed by classification symbols)

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Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, INSPEC, PAJ, IBM-TDB, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 585 801 A (THURSTON ANDREW M) 17 December 1996 (1996-12-17) abstract; figures 4,5 column 1, line 10 - line 12 column 2, line 55 - line 61 column 2, line 64 - column 3, line 8 column 6, line 19 - line 31 ---	1-7
A	WO 91 11863 A (ANALOG DEVICES INC) 8 August 1991 (1991-08-08) -----	

☐ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

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Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Oliveira, J.

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Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5585801	A	17-12-1996	GB 2281828 A	15-03-1995
WO 9111863	A	08-08-1991	US 5055843 A	08-10-1991
			DE 69107059 D1	09-03-1995
			DE 69123366 D1	09-01-1997
			EP 0513241 A1	19-11-1992
			EP 0586021 A1	09-03-1994
			JP 5505287 T	05-08-1993
			US 5311181 A	10-05-1994
			WO 9111863 A1	08-08-1991